

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

In re application of ) Atty. Docket No.: **ASAMU0005**  
Jinko KIMURA et al. ) Confirmation No.: 8406  
Serial No. 09/508,771 )  
Filed: March 16, 2000 ) Group Art Unit: 1752  
For: PHOTORESISTIVE FILM ) Examiner: Amanda C. WALKE  
 ) Date: May 4, 2007

**REVISED APPEAL BRIEF**

**MAIL STOP: APPEAL BRIEF**

United States Patent and Trademark Office  
Customer Service Window  
Randolph Building  
401 Dulany Street  
Alexandria, VA 22314

Sir:

In view of the Notification of Non-Compliant Appeal Brief, mailed April 6, 2007, Applicants respectfully submit this Revised Appeal Brief under 37 C.F.R. § 1.191 with respect to the above-captioned application. The present Appeal Brief addresses and responds to all outstanding issues set forth in the Final Office Action mailed March 13, 2006, and addresses the issue raised by the Examiner in the April 6, 2007 Notification of Non-Compliant Appeal Brief.

**Real Party in Interest**

The real party of interest is Hitachi Chemical Company, LTD., of Tokyo, Japan.

**Related Appeals and Interferences**

There are no related appeals or interferences with respect to the above-captioned application.

**Status of the Claims**

Claims 11, 20, 26 and 39-41 have been canceled without prejudice. Claims 1-10, 12-19, 21-25, 27-38 and 42-45 stand rejected and are appealed. A copy of the appealed claims is also provided in Appendix A attached herewith.

**Status of Amendments**

Amendment (I), filed December 27, 2005, has been entered by the Examiner per the Final Office Action mailed March 13, 2006.

**Summary of the Claimed Subject Matter**

The present invention pertains generally to a photosensitive film usable in metal etching fabrication of lead frames, metal masks, and the like, with reduced generation of air voids which cause formation of defective patterns and breakage of wire. Thus, a photosensitive film, in accordance with the present invention, includes a support film, a photosensitive resin layer formed on the support film, and a protecting film stuck onto the photosensitive resin layer wherein the protecting film has a population of fish eyes of a diameter of at least 80  $\mu\text{m}$  in a number not exceeding 5 per square meter when measured under a microscope at a multiplication of 100.

In particular, the embodiments of independent claims 1, 19, 36, 38, 42, 43, 44, 45 and 46 pertain to a photosensitive film that includes a support film, a photosensitive resin layer formed on the support film, and a protecting film stuck onto the photosensitive resin layer (for example, see Figure 1a, Abstract, and at 5, lines 10-14, of Applicants' original specification), and wherein the protecting film has fish eyes of a diameter of at least 80  $\mu\text{m}$  in a number not exceeding 5 per square meter when measured under a microscope at a multiplication of 100 (for example, see Abstract, and at 5, lines 10-17, and at 18, lines 9-13, of Applicants' original specification).

Independent claim 1 additionally recites that the photosensitive resin layer is a photosensitive resin composition-containing photosensitive resin layer that has a film thickness of 5 to 30  $\mu\text{m}$  (for example, see specification at 5, lines 10-19) and whereby generation of air voids between the photosensitive resin layer and a substrate after lamination of the photosensitive film on the substrate while removing the protecting film from the photosensitive film is reduced (for example, see specification at 4, lines 22-27).

Claim 12 depends upon claim 2, which depends upon claim 1, and additionally recites that the photosensitive resin composition in the photosensitive resin layer comprises a binder polymer formed by copolymerizing acrylic acid or methacrylic acid and alkyl esters thereof as constituent monomers, a monomer having at least one polymerizable ethylenically unsaturated group in the molecule thereof; and a photopolymerization initiator (for example, see specification at 6, lines 15-23) wherein the photopolymerization initiator contains 2,4,5-triarylimidazole dimer (for example, see specification at 10, lines 20-22).

Independent claim 19 additionally recites that generation of air voids between the photosensitive resin layer and a substrate after lamination of the photosensitive film on the substrate while removing the protecting film from the photosensitive film is reduced (for example, see specification at 4, lines 22-27).

Claim 27 depends upon claim 23, which depends upon claim 19, and additionally recites that the photosensitive resin composition in the photosensitive resin layer comprises a binder polymer formed by copolymerizing acrylic acid or methacrylic acid and alkyl esters thereof as constituent monomers, a monomer having at least one polymerizable ethylenically unsaturated group in the molecule thereof; and a photopolymerization initiator (for example, see specification at 6, lines 15-23) wherein the photopolymerization initiator contains 2,4,5-triarylimidazole dimer (for example, see specification at 10, lines 20-22).

Independent claim 36 additionally recites that the photosensitive resin layer is a photosensitive resin composition-containing photosensitive resin layer that has a film thickness of 5 to 30  $\mu\text{m}$  (for example, see specification at 5, lines 10-19) and wherein generation of air voids after laminating the photosensitive resin layer on a substrate after lamination of the photosensitive film on the substrate while removing the protecting film from the photosensitive film at the time of lamination is reduced (for example, see specification at 18, lines 2-5, and Table 2 at 19 of Applicants' original specification).

Independent claim 38 additionally recites that the photosensitive resin layer is a photosensitive resin composition-containing photosensitive resin layer that has a film thickness of 5 to 30  $\mu\text{m}$  (for example, see specification at 5, lines 10-19) and whereby generation of air voids is reduced between the photosensitive resin layer and a substrate after the photosensitive resin layer is laminated on the substrate after removal of the protecting film from the photosensitive resin layer (for example, see specification at 4, lines 22-27).

Furthermore, independent claim 38 recites that the support film is selected from the group consisting of polyester films and polyethylene terephthalate films (for example, see specification at 5, line 24, to 6, line 3).

Independent claim 42 additionally recites that the photosensitive resin layer is a photosensitive resin composition-containing photosensitive resin layer that has a film thickness of 5 to 30  $\mu\text{m}$  (for example, see specification at 5, lines 10-19) and whereby generation of air voids between the photosensitive resin layer and a substrate after lamination of the photosensitive film on the substrate while removing the protecting film from the photosensitive film is reduced (for example, see specification at 4, lines 22-27). Furthermore, independent claim 42 recites that the photosensitive resin composition in the photosensitive resin layer comprises a binder polymer formed by copolymerizing acrylic acid or methacrylic acid and alkyl esters thereof as constituent monomers, a monomer having at least one polymerizable ethylenically unsaturated group in the molecule thereof, wherein the monomer is bisphenol A polyoxyalkylene diacrylate, or contains bisphenol A polyoxyalkylene dimethacrylate as a component, and a photopolymerization initiator (for example, see specification at 6, lines 15-23, and at 8, line 25, to at 26, line 25).

Independent claim 43 additionally recites that the photosensitive resin composition in the photosensitive resin layer comprises a binder polymer formed by copolymerizing acrylic acid or methacrylic acid and alkyl esters thereof as constituent monomers, a monomer having at least one polymerizable ethylenically unsaturated group in the molecule thereof, wherein the monomer is bisphenol A polyoxyalkylene diacrylate, or contains bisphenol A polyoxyalkylene dimethacrylate as a component, and a photopolymerization initiator (for example, see specification at 6, lines 15-23, and at 8, line 25, to at 26, line 25). Independent claim 43 also recites that generation of air voids between the photosensitive resin layer and a

substrate after lamination of the photosensitive film on the substrate while removing the protecting film from the photosensitive film is reduced (for example, see specification at 4, lines 22-27).

Independent claim 44 additionally recites that the photosensitive resin layer is a photosensitive resin composition-containing photosensitive resin layer that has a film thickness of 5 to 30  $\mu\text{m}$  (for example, see specification at 5, lines 10-19) and whereby generation of air voids between the photosensitive resin layer and a substrate after lamination of the photosensitive film on the substrate while removing the protecting film from the photosensitive film is reduced (for example, see specification at 4, lines 22-27). Independent claim 44 also recites that the protecting film is made of resin filtered after thermal melting (for example, see specification at 14, lines 12-16).

Independent claim 45 additionally recites that generation of air voids between the photosensitive resin layer and a substrate after lamination of the photosensitive film on the substrate while removing the protecting film from the photosensitive film is reduced (for example, see specification at 4, lines 22-27) and that the protecting film is made of resin filtered after thermal melting (for example, see specification at 14, lines 12-16).

Independent claim 46 additionally recites that that the photosensitive resin layer is a photosensitive resin composition-containing photosensitive resin layer that has a film thickness of 5 to 30  $\mu\text{m}$  (for example, see specification at 5, lines 10-19) and wherein generation of air voids after laminating the photosensitive resin layer on a substrate after lamination of the photosensitive film on the substrate while removing the protecting film from the photosensitive film at the time of lamination is reduced (for example, see specification at 18, lines 2-5, and Table 2 at 19 of Applicants' original specification).

Furthermore, independent claim 46 recites that the protecting film is made of resin filtered after thermal melting (for example, see specification at 14, lines 12-16).

The various embodiments, in accordance with the present invention, advantageously provide superior photosensitive films because the size and number of fish eyes in the fish eye population of the film is minimized. In other words, the relatively small and few fish eyes in the protecting film of the photosensitive films of the present invention improve quality and yield of semiconductor elements when manufacturing semiconductor elements.

### **Grounds of Rejection to be Reviewed on Appeal**

The grounds for rejection presented for review are (1) the rejection of independent claims 1, 19, 36, 38, 44, 45 and 46 under 35 U.S.C. § 103(a) over U.S. Patent 4,360,582 to Taguchi (hereafter the “Taguchi Patent”) in view of U.S. Patent 5,198,484 to Mannion (hereafter the “Mannion Patent”), (2) the rejection of dependent claims 12 and 27 under 35 U.S.C. 103(a) over the Taguchi Patent in view of the Mannion Patent, and further in view of U.S. Patent 4,710,446 to Hoffman (hereafter the “Hoffman Patent”), and (3) the rejection of independent claims 42 and 43 under 35 U.S.C. § 103 over the Taguchi Patent in view of the Mannion Patent, and further in view of U.S. Patent 5,589,306 to Takahashi et al. (hereafter the “Takahashi Patent”).

**Applicants' Arguments****1. A Prima Facie Case of Obviousness Under 35 U.S.C. § 103 Has Not Been Established Because Numerous Limitations in the Claims Have Been Ignored or Misconstrued.**

A patentability analysis under 35 U.S.C. § 103 requires (a) determining the scope and content of the prior art, (b) ascertaining the differences between the prior art and the claimed subject matter, (c) resolving the level of ordinary skill in the pertinent art, and (d) considering secondary considerations that may serve as indicia of nonobviousness or obviousness. Graham v. John Deere Co. of Kansas City, 383 U.S. 1, 17-18; 86 S.Ct. 684, 694; 148 U.S.P.Q. 459, 467 (1966).

In the present case, claims 1-10, 13-19, 21-25, 28-38 and 44-46 stand rejected under 35 U.S.C. § 103(a) over the Taguchi Patent in view of the Mannion Patent, claims 12 and 27 stand rejected under 35 U.S.C. 103(a) over the Taguchi Patent in view of the Mannion Patent, and further in view of the Hoffman Patent, and claims 42 and 43 stand rejected under 35 U.S.C. § 103(a) over the Taguchi Patent in view of the Mannion Patent, and further in view of the Takahashi Patent. However, as will be explained below, multiple elements in the claims, as properly construed, are not present in the asserted combinations. Specifically, the rejection ignores or misconstrues numerous elements of the claims. Appellants' position is explained in detail as follows.

**A. Claims 1, 19, 36, 38, 44, 45 and 46**

The following general argument pertains to independent claims 1, 19, 36, 38, 44, 45 and 46, and to dependent claims 2-10, 13-19, 21-25 and 28-38, wherein the combination of the Taguchi Patent and the Mannion Patent does not reasonably disclose a “a protecting film...wherein...the number of fish eyes having a diameter of at least 80  $\mu\text{m}$ ...does not exceed 5 fish eyes/ $\text{m}^2$  when measured under a microscope at a multiplication of 100” as recited in independent claims 1, 36, 38 and 44-46 and “a protecting film...wherein the protecting film has fish eyes of a diameter of at least 80  $\mu\text{m}$  in a number not exceeding 5 per square meter when measured under a microscope at a multiplication of 100” as recited by independent claim 19.

**i. The Taguchi Patent**

The Taguchi Patent discloses a “photopolymerizable element” for producing photoresists used in manufacturing printed circuit boards that includes: (1) a layer of a photopolymerizable composition, (2) a support film laminated to the composition layer and optionally (3) a strippable protective film (see Abstract of Taguchi Patent). The thickness of the composition layer is 0.1 to 1,000  $\mu$ , or more preferably 5 to 70  $\mu$ , (Taguchi Patent, col. 9, lines 15-19), with the thickness of the film support being 5 to 100  $\mu$  (Taguchi Patent, col. 9, lines 20-22) and the thickness of the protective film being 8 to 80  $\mu$ , or more preferably 10 to 30  $\mu$  (Taguchi Patent, col. 10, lines 22-23). The protective film may be a polypropylene film or a polyethylene film (Taguchi Patent, col. 14, lines 57-60, and col. 16, lines 43-65).

More specifically, the Taguchi Patent discloses that the protective film is provided on one surface of the photopolymerizable layer and the support film is laminated onto the other surface, wherein the protective layer is used for preventing blocking at the winding step and adhesion of dust during handling (Taguchi Patent, col. 3, lines 62-68). The Taguchi Patent discloses that the film support is a transparent film capable of being dissolved or dispersed in a developer, and that the support film is selected from the group consisting of methyl methacrylate homopolymer and copolymers, vinyl chloride homopolymer and copolymers, polyvinyl alcohol, and mixtures thereof (Taguchi Patent, col. 4, lines 51-62). The Taguchi Patent discloses the use of trimethylolpropane trimethacrylate as a photopolymerizable monomer for making a photopolymerizable layer, but that other materials such as the methyl methacrylate homopolymer and copolymer and a list of other compounds would be used as an organic polymer binder (Taguchi Patent, col. 5, line 27, to col. 6, line 23).

The Taguchi Patent discloses that the use of polyethylene terephthalate as the support film has certain disadvantages, such as a tendency for the photosensitive layer to be destroyed when stripping the support film when the thickness of the photosensitive layer is reduced (Taguchi Patent, col. 2, line 38, to col. 3, line 8). The Taguchi Patent also discloses that the protective film could be selected from a polyethylene terephthalate film, a polypropylene film, a polyethylene film, a cellulose triacetate film, a cellulose diacetate film, a polyamide film, a polytetrafluoroethylene film, a paper, a polyethylene-laminated paper and a polypropylene-laminated paper (Taguchi Patent, col. 10, lines 15-24). It is important to note that Taguchi discloses that the protective film (10), such as shown in Figure 4, is an optional feature of the photopolymerizable element (Taguchi Patent, col. 14, lines 57-60). The Taguchi Patent also discloses that the photosensitive film may include a

photopolymerizable layer having a dry thickness of 10  $\mu$  that is coated onto a 50- $\mu$  thick polypropylene film (Taguchi Patent, col. 16, lines 43-64).

The Taguchi Patent explains an application of the photopolymerizable element referred to in Figures 1 to 9 (Taguchi Patent, col. 14, line 43, to col. 15, line 35). As shown in Figure 5, the protective film (10), (e.g., a polypropylene film) is peeled off and the surfaces of the photopolymerizable layers (9) and (12) are applied to both surfaces of the copper-clad insulating substrate, whereby at least both openings of each of the through-holes (4), (5) are covered with the photopolymerizable layers (9) and (12), (See Fig. 5 of Taguchi Patent and col. 14, line 59, to col. 15, line 1). The diameter of the through-holes (4) and (5), which have no relation to the fish eyes, are by far larger than the size of fish eyes. In view of the above, it is evident that the Taguchi Patent is not addressing the fish eye problem solved by the present invention.

As admitted by the Examiner (Office Action, dated November 21, 2001, at 5, lines 7-8), the Taguchi reference does not disclose “explicit details pertaining to the protective film”, which includes the claimed feature of a protecting layer that has a “number of fish eyes having a diameter of at least 80  $\mu\text{m}$  that does not exceed 5 fish eyes/ $\text{m}^2$  when measured under a microscope at a multiplication of 100” as recited by independent claims 1, 36, 38 and 44-46 and “a protecting film...wherein the protecting film has fish eyes of a diameter of at least 80  $\mu\text{m}$  in a number not exceeding 5 per square meter when measured under a microscope at a multiplication of 100” as recited by independent claim 19. In fact, the Examiner has repeatedly conceded that “Taguchi is silent on fish eyes” (Office Action, dated march 13, 2006, at 3, line4-5; Office Action, dated January 11, 2005, at 3, line 11; Office Action, dated March 24, 2004, at 4, line 1; and Office Action, dated August 25, 2005, at 3, lines 16-17).

Although the Examiner contends that the Taguchi Patent discloses the use of a polypropylene protective film (Office Action, dated March 13, 2006, at 3, line 5), the Examiner has conceded the fact that conventional polypropylene films vary in their characteristics (for example, see Applicants' specification, Table 2 at 19; and Ishikawa's Second Declaration under 37 C.F.R. § 1.132, filed June 13, 2005 (hereafter the "Second Ishikawa Declaration"), ¶¶ 2, 9-16 and 18) and contain fish eyes exceeding those recited by the claims of the present application (Office Action, dated August 25, 2005, at 7, lines 13-16). As established by the Second Ishikawa Declaration, ¶¶ 10-16, the physical properties of polypropylene films, such as the number and size of fish eyes of polypropylene films used as protective films, vary depending upon the manufacturing conditions of the film. For example, Example 2 and Comparative Example 2 of Table 2, at 19 of Applicants' specification, demonstrates that different polypropylene protecting films may have substantially different fish eye populations. The Second Ishikawa Declaration, ¶¶ 9-16 and 18, also establishes the fact that the polypropylene protective films taught by the Taguchi Patent would not inherently have the fish eye population recited by Applicants' claims. In fact, it is highly unlikely that a conventional polypropylene film would have the same fish eye population as that of the presently claimed invention (Second Ishikawa Declaration, ¶¶ 16 and 18).

For all of the above reasons, the Taguchi Patent does not disclose, or even suggest, a protecting layer that has a "number of fish eyes having a diameter of at least 80 µm that does not exceed 5 fish eyes/m<sup>2</sup> when measured under a microscope at a multiplication of 100" as recited by independent claims 1, 36, 38 and 44-46 and "a protecting film...wherein the protecting film has fish eyes of a diameter of at least 80 µm in a number not exceeding 5 per

square meter when measured under a microscope at a multiplication of 100” as recited by independent claim 19.

### **ii. The Mannion Patent**

The Mannion Patent discloses a “polyolefin composition containing ultrafine sorbitol and xylitol acetals” wherein a clarifying agent is incorporated into a semi-crystalline resin (See Abstract of Mannion Patent). More specifically, the Mannion Patent discloses the use of a clarifying agent for the purpose of reducing haze in articles manufactured from crystalline polyolefin resin (Mannion Patent, claim 1, and col. 1, lines 5-16). The purpose of the process and composition taught by Mannion is to address the formation of “white points,” which are bubbles formed when articles are fabricated from clarified polyolefin resins using injection molding techniques (Mannion Patent, col. 2, lines 3-7). The Mannion Patent discloses that “white point” bubbles are a problem associated with the use of sorbitol and xylitol acetal clarifying agents in polyolefin resin (Mannion Patent, col. 2, lines 3-7). During injection molding of polyolefin resins, small bubbles (i.e., “white points”) form in the side walls of injection molded housewares and medical devices due to the release of gas or volatile liquids from sintered particles upon melting during fabrication operations (Mannion Patent, col. 2, lines 7-10, and col. 5, lines 17-31).

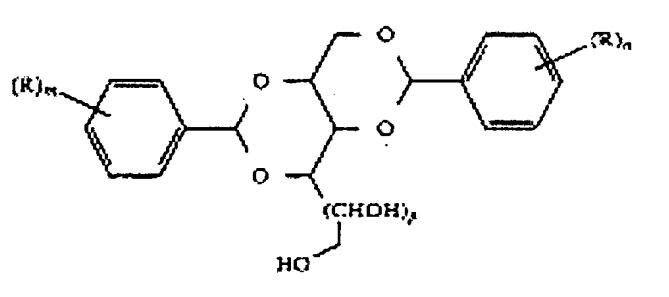
The Mannion Patent also refers to another type of bubble, known as “fish eyes,” that reportedly may form in articles of manufacture made of clarified polyolefin resin that are heated too close to the melting point of the resin (Mannion Patent, col. 2, lines 34-39). Therefore, when reading the Mannion disclosure, a person of ordinary skill in the art would realize that “bubbles” form in clarified polyolefin resins for a variety of different reasons. One type of “bubble,” the “white point,” forms due to sintering with gas release that occurs

when injection molding polyolefin resin, and another type of “bubble,” the “fish eye,” is caused by heating the resin near its melting point.

A “fish eye” in accordance with Applicants’ specification, at 3, lines 5-13, is a defect that is caused by imperfections (i.e., unmelted material or thermally deteriorated regions) created by uneven heating of raw material (See also Second Ishikawa Declaration, ¶ 10). A person of ordinary skill in the art would appreciate that the “fish eye” defects described by the Mannion Patent and by Applicants’ specification are similar in that these defects are caused by heating. On the other hand, a person of ordinary skill in the art would realize that the “white point” bubbles formed on the sides of molds by gas released during injection molding is a substantially different defect than that of the “fish eyes” described by both the Mannion Patent and Applicants’ specification.

The Mannion Patent clearly states that the defects it addresses are “white point” bubbles (Mannion Patent, col. 3, lines 8-13). The Mannion Patent does not disclose, or even suggest, that its method and composition reduces “fish eyes” such as those recited in the present claims. In other words, the Mannion Patent does not disclose, or suggest, a polyolefin resin film that includes not exceeding 5 number/m<sup>2</sup> of unmelted materials and thermally deteriorated regions (i.e., “fish eyes”) having a diameter of 80 µm or more as the Examiner contends. Furthermore, the Mannion Patent does not disclose, or suggest, any polyolefin resin film such as would be suitable for use as a protecting film for a photosensitive film.

The fact that the Mannion Patent addresses “white point” bubbles and not “fish eyes” is made even clearer by the description of how “white point” bubbles are measured. The Mannion Patent discloses that, after injection molding compounded resin pellets, resin plaques were visually inspected for the presence of “white point” bubbles (Mannion Patent, col. 9, 15-23). More specifically, the Mannion Patent states that “compounded pellets were tested for [“white point”]bubble formation by injection molding them into 2”X3”X0.05” plagues at 210°C. on a 40-ton injection molding machine. The plaques were analyzed visually for the presence of [“whitepoint”] bubbles.” (Mannion Patent, col. 9, lines 15-20). While the Mannion Patent discloses that “white point” bubbles large enough to see with the naked eye were eliminated from injection molded articles (Mannion Patent, col. 9, lines 45-48), it is silent about the population of “fish eyes” as referred to in the present claims. Although the Mannion Patent refers to “fish eyes” in the “Background of the Invention” (Mannion Patent, col. 2, lines 3-47), this patent neither addresses the formation of fish eyes in sorbitol acetal clarified resins, nor is it measuring their presence, when employing sorbitol and xylitol di-acetal clarifying agents having the general formula:



wherein p is 0 or 1, m and n are independently 0 to 3, and R is, at each occurrence, independently selected from C<sub>1-8</sub> alkyl, C<sub>1-4</sub> alkoxy, hydroxyl, halogen, C<sub>1-6</sub> alkylthio, C<sub>1-6</sub> alkylsulfoxy and a 4 or 5 membered alkyl group forming a carbocycli ring with adjacent

carbon atoms of the unsaturated parent ring (Mannion Patent, col. 3, lines 45-65, col. 5, lines 3-5, and lines 23-27).

The only defects the Mannion Patent tested for in the resin plaques studied were large “white point” bubbles formed during injection molding. Only defects large enough to be detected by the naked eye were considered by the Mannion Patent, col. 9, lines 18-19. “Fish eyes,” in accordance with the present claims, are caused by a substantially different mechanism than “white points” and are small enough that they may not be detected by the naked eye (See instant specification, page 3, lines 8-13, and originally filed Fig. 1A; and Second Ishikawa Declaration, ¶ 17). As recited in claims 1, 36, 38 and 44-46, the protecting layer has a “number of fish eyes having a diameter of at least 80  $\mu\text{m}$  that does not exceed 5 fish eyes/ $\text{m}^2$  when measured under a microscope at a multiplication of 100” and, as recited in claim 19, the “protecting film...wherein the protecting film has fish eyes of a diameter of at least 80  $\mu\text{m}$  in a number not exceeding 5 per square meter when measured under a microscope at a multiplication of 100.” But the visual inspection test performed in the Mannion Patent cannot detect defects smaller than 89  $\mu\text{m}$  because this is the resolution limit of the human eye (See the NDT Resource Center webpage, of record; and the Appendix of Amendment (G), filed September 24, 2004; and Second Ishikawa Declaration, ¶ 17).

A person of ordinary skill in the art would realize that the injection molded resin plaques taught by the Mannion Patent may be riddled with thousands of “fish eye” defects too small for the human eye to detect while being free of large “white point” defects that can be seen by the naked eye, if present. In other words, the Mannion Patent discloses a resin plaque that is free of “white point” bubbles that are large enough to be detected by the visual inspection test employed by the Mannion Patent. The Examiner’s contention that the elimination of all naked-eye visually detectable “white point” bubbles from the resin plaques,

as taught by the Mannion Patent, should be construed to include the elimination of bubbles smaller than what the naked eye can detect as well as “fish eye” bubbles is unreasonable and misconstrues the scope of subject matter actually taught by the Mannion Patent.

In particular, a person of ordinary skill in the art would realize that it is not possible to reduce the number of “fish eyes,” when this term is properly construed to be defects due to unmelted raw material or thermally deteriorated regions, by using sorbitol clarifying agent and/or xylitol acetal clarifying agent. On the contrary, a person of ordinary skill in the art would realize that the sorbitol clarifying agent and/or the xylitol acetal clarifying agent (which is a powder of mean particle diameter of 15  $\mu\text{m}$  or less, see Mannion Patent, col. 6, lines 45-49) may form agglomerates or become a nucleus for creating “fish eye” defects in the first place (See, e.g., Mannion Patent at col. 3, lines 15-29). Thus, by the addition of the clarifying agent, either sorbitol clarifying agent and/or xylitol acetal clarifying agent, to the resin taught by the Taguchi Patent, the number of “fish eyes” having a diameter of 80  $\mu\text{m}$  or more would be expected to undesirably increase.

Additionally, sorbitol and xylitol acetal clarifying agents are used to improve the transparency of polyolefin goods. However, the transparency of a protecting film is not an issue relevant to the presently claimed invention, and none of the examples described in Applicants’ specification employ either sorbitol and/or xylitol acetal clarifying agents for the purpose of making the protecting film. Likewise, film transparency is not an issue relevant to the protective film taught by the Taguchi Patent. On the other hand, the Mannion Patent is silent regarding the manufacture of photosensitive films, protecting films, or even films in general for that matter. Therefore, the subject matter taught by the Mannion Patent is not relevant to either Applicants’ invention or to the subject matter of the Taguchi Patent. In

short, the Mannion Patent is non-analogous art because it is from an entirely different field of endeavor than that of the subject matter of the present invention and of the Taguchi Patent.

It is a well established proposition that in order to rely on a reference as a basis for an obviousness rejection under 35 U.S.C. § 103, the reference must either be from the same field of endeavor as the applicants' invention or must be reasonably pertinent to the particular problem with which the inventor was concerned. In re Oetiker, 24 U.S.P.Q.2d 1443, 1445 (Fed. Cir. 1992). In this case, the Mannion Patent is not from the same field of endeavor as the subject matter of the present invention because the Mannion Patent pertains to improving the transparency of injection molded resin articles whereas the present invention is concerned with reducing defects in photosensitive films, which are not injected molded articles. Furthermore, the Mannion Patent is not reasonably pertinent to the particular problem addressed by the present invention, which is to reduce the number of "fish eye" defects (i.e., defects caused by unmelted raw material or thermally degraded regions) in a protecting film of a photosensitive film. Instead, the Mannion Patent relates to eliminating visually detectable "white point" defects, which are encountered during injection molding and degrade the transparency of injection molded articles. On these facts, it is evident that the Mannion Patent is non-analogous art.

For all of the above reasons, it is evident that the Mannion Patent does not disclose, or suggest, a technique for eliminating "fish eye" defects in the photosensitive films as claimed. Therefore, the Mannion Patent does not disclose, or suggest, a protecting layer that has a "number of fish eyes having a diameter of at least 80  $\mu\text{m}$  that does not exceed 5 fish eyes/ $\text{m}^2$ " when measured under a microscope at a multiplication of 100" as recited by independent claims 1, 36, 38 and 44-46 and "a protecting film...wherein the protecting film has fish eyes

of a diameter of at least 80  $\mu\text{m}$  in a number not exceeding 5 per square meter when measured under a microscope at a multiplication of 100" as recited by independent claim 19.

### **iii. Summary of Disclosures**

The Taguchi Patent discloses a photopolymerizable element that includes a layer of photopolymerizable composition, a film support laminated to the composition layer, and optionally a stripable protective film. The protective film taught by the Taguchi Patent may be a polypropylene film. However, the Taguchi Patent is silent with respect to the number and size of "fish eyes" in the protective film. Because the number of "fish eyes" in polypropylene protective films vary substantially, the Taguchi Patent does not disclose, or suggest, a protecting layer that has a "number of fish eyes having a diameter of at least 80  $\mu\text{m}$  that does not exceed 5 fish eyes/ $\text{m}^2$  when measured under a microscope at a multiplication of 100" as recited by independent claims 1, 36, 38 and 44-46 and "a protecting film...wherein the protecting film has fish eyes of a diameter of at least 80  $\mu\text{m}$  in a number not exceeding 5 per square meter when measured under a microscope at a multiplication of 100" as recited by independent claim 19.

The Mannion Patent discloses a polyolefin composition containing sorbitol and/or xylitol acetal clarifying agents in order to improve transparency of injected molded resin articles by eliminating "white points," which are large "bubbles" visible to the naked eye and caused by the release of gas during sintering of resin particles during injection molding. The Mannion Patent is silent with respect to reducing "fish eye" defects and, in fact, is non-analogous art because it is from a different field of endeavor (i.e., injection molding resin articles) than that of the present invention (i.e., forming photosensitive films) and because the issue addressed by the Mannion Patent (i.e., the improvement of resin transparency) is not

relevant to the object of the present invention (i.e., reduction of “fish eye” defects). Thus, the Mannion Patent does not disclose, or suggest, a protecting layer that has a “number of fish eyes having a diameter of at least 80  $\mu\text{m}$  that does not exceed 5 fish eyes/ $\text{m}^2$  when measured under a microscope at a multiplication of 100” as recited by independent claims 1, 36, 38 and 44-46 and “a protecting film...wherein the protecting film has fish eyes of a diameter of at least 80  $\mu\text{m}$  in a number not exceeding 5 per square meter when measured under a microscope at a multiplication of 100” as recited by independent claim 19.

As is evident, because neither the Taguchi Patent nor the Mannion Patent disclose, or suggest, a protecting layer that has a “number of fish eyes having a diameter of at least 80  $\mu\text{m}$  that does not exceed 5 fish eyes/ $\text{m}^2$  when measured under a microscope at a multiplication of 100” as recited by independent claims 1, 36, 38 and 44-46 and “a protecting film...wherein the protecting film has fish eyes of a diameter of at least 80  $\mu\text{m}$  in a number not exceeding 5 per square meter when measured under a microscope at a multiplication of 100” as recited by independent claim 19, the Examiner has not established a prima facie showing of obviousness against claims 1, 19, 36, 38 and 44-46 of the above-captioned application.

#### **iv. No Proper Motivation or Suggestion to Combine**

A proper rejection under Section 103 further requires showing (1) that the prior art would have suggested to a person of ordinary skill in the art that they should make the claimed device or carry out the claimed process, (2) that the prior art would have revealed to a person of ordinary skill in the art that in so making or doing, there would have been a reasonable expectation of success, and (3) both the suggestion and the reasonable expectation of success must be found in the prior art and not in the applicants’ disclosure. In re Vaeck, 20 U.S.P.Q.2d 1438, 1442 (Fed. Cir. 1991). However, the combination of elements from non-analogous

sources is insufficient to establish a prima facie case of obviousness. In re Oetiker, 24 U.S.P.Q.2d 1443, 1445 (Fed. Cir. 1992).

In this case, for the reasons discussed above, the Mannion Patent is non-analogous art. Therefore, since there is no motivation to combine the disclosure of the Mannion Patent with the disclosure of the Taguchi Patent a prima facie case of obviousness cannot be made against independent claims 1, 19, 36, 38 and 44-46 of the above-captioned application. Furthermore, as discussed above, the addition of sorbitol and/or xylitol acetal clarifying agent to the resin used to make the polypropylene film of the Taguchi Patent is likely to increase the number of “fish eye” defects while decreasing non-existent “white point” defects. Therefore, the Examiner has also failed to establish that even if the combination of the Taguchi Patent with the material disclosed by the Mannion Patent were properly motivated (which it is not) that there would be a reasonable likelihood of success at arriving at Applicant’s claimed number of “fish eyes” having a “diameter of at least 80  $\mu\text{m}$ ” as recited in independent claims 1, 19, 36, 38 and 44-46 of the above-captioned application

#### v. Other Errors Made by the Examiner

The Examiner’s rejections are all predicated on the notion that the “protecting film... would have the same number of fish eyes at the given diameter no matter how it is evaluated” (Office Action, dated January 11, 2005, at 2, lines 2-7; and Office Action, dated March 24, 2004, at 2, lines 11-16). The Examiner explicitly states that “the method of measuring is not given [patentable] weight” (Office Action, dated March 13, 2006, at 7, lines 2-5). The Examiner’s observation and conclusion are, quite simply, erroneous. More fish eyes can be seen at a magnification of 100 than can be seen with the naked eye, for example, as explained by Mr. Ishikawa (Second Ishikawa Declaration, ¶¶ 17, 20 and 21). As a further simple

example, if no fish eyes are seen with the naked eye that does not mean that no fish eyes will be seen at a multiplication of 100. This is particularly true if defects of 80 $\mu\text{m}$  diameter, as recited in the claims, are measured, because those defects are below the limit of detection with the naked eye.

For the above reasons, the recitation of “the number of fish eyes having a diameter of at least 80  $\mu\text{m}$  included in said protecting film... does not exceed 5 fish eyes/ $\text{m}^2$  when measured under a microscope at a multiplication of 100,” such as recited in claim 1, employs the phrase “when measured under a microscope at a multiplication of 100” in a manner that does further limit the claims. Thus, the Examiners’ rejection of claims 1, 19, 36, 38 and 44-46 is facially flawed and must be withdrawn because it does not give patentable weight to the phrase “when measured under a microscope at a multiplication of 100” and because neither the Taguchi Patent nor the Mannion Patent disclose or suggest this limitation of the claimed invention.

As discussed above, how the “fish eyes” are measured does effect the observed “fish eye” population, and it is an observed “fish eye” population that is recited as a limitation in Applicants’ claims. On the other hand, it is an observed “white point” population that is reasonably taught by the Mannion Patent. The Mannion Patent explicitly quantifies its “white point” population based on visualization using a naked eye; therefore, the use of the term “eliminates” in the context of the Mannion Patent’s specification, when taken as a whole, is limited to the elimination of “white point” defects that are visible to the naked eye. There is no teaching in the Mannion Patent that would lead a person of ordinary skill in the art to believe that “white point” defects smaller than what the naked eye can detect have been eliminated.

Applicants' remind the Examiner that a reference must be given a fair reading for what it teaches as a whole. In re Gordon, 221 U.S.P.Q. 1125, 1127 (Fed. Cir. 1984). In this case, the Mannion Patent discloses evaluation of resin plagues using the naked eye. Therefore, the disclosure of the Mannion Patent with respect to characterizing the population of "white point" defects is limited to defects that are observable by the naked eye. The Mannion Patent discloses or suggests nothing regarding the presence of "white point" defects that are smaller than the limits of detection achievable by the tests employed by the Mannion Patent (i.e., visual scanning with the naked eye). Therefore, the Examiner's contention that the Mannion Patent discloses the elimination of "white points" that are smaller than what the naked eye can detect is neither explicitly taught by the Mannion Patent, nor reasonably inferable from the disclosure of the Mannion Patent. In sum, the Examiner has not given a fair reading of what the Mannion Patent discloses as a whole when the Examiner contends that the Mannion Patent discloses elimination of all "white points" including those smaller than the tests employed by the Mannion Patent could possibly detect. The Mannion Patent discloses nothing regarding defects smaller than those that can be seen by the naked eye.

Because the Examiner has failed to give patentable weight to the phrase "when measured under a microscope at a multiplication of 100" as recited by claims 1, 19, 36, 38 and 44-46, and because the Examiner has failed to recognize that the Mannion Patent discloses the use of a specific class of sorbitol and xylitol di-acetal clarifying agents for eliminating "white points" and not "fish eyes," the Examiner's Section 103 rejection is based on a misinterpretation of the claims, is fatally flawed and must be withdrawn.

The Examiner also erroneously contends that the Mannion Patent discloses the elimination of "fish eyes" from injection molded articles (Office Action, dated March 13,

2006, at 7, lines 15-18). While the Mannion Patent discloses that there are two types of bubble defects, “white points” and “fish eyes,” this distinction is made in the “Background of the Invention” (Mannion Patent, col. 2, lines 5-53). When the Mannion Patent describes its new sorbitol and xylitol di-acetal clarifying agent, it discusses only the elimination of “white point” bubbles (Mannion Patent, col. 5, lines 3-27). Therefore, a person of ordinary skill in the art, after reading the Mannion Patent, would instantly realize that the Mannion Patent discloses sorbitol and xylitol di-acetal clarifying agents for eliminating “white point” bubbles that are large enough to see with the naked eye, and that it does not disclose a mechanism for eliminating “fish eyes,” including “fish eyes” that are smaller than can be detected by the naked eye.

**B. Claims 12 and 27**

Claims 12 and 27 depend, respectively, on claims 2 and 23, which depend respectively on independent claims 1 and 19. Therefore, the arguments in support of instant claims 12 and 27, respectively, incorporates the arguments in support of patentability of claims 1 and 19.

The following additional general argument pertains to claims 12 and 27, wherein the combination of the Taguchi Patent, the Mannion Patent and the Hoffman Patent does not reasonably disclose the claimed population of “fish eyes” that is “measured under a microscope at a multiplication of 100” and additionally recite that “the photoinitiator...contains 2,4,5-triarylimidazole dimmer.” As admitted by the Examiner, the Taguchi Patent fails to disclose, or even suggest, “the photoinitiator...contains 2,4,5-triarylimidazole dimmer” as recited in claims 12 and 27 (Office Action, dated March 13, 2006, at 6, lines 2-5; and Office Action, dated August 25, 2005, at 6, lines 4-10).

**i. The Hoffman Patent**

The Hoffman Patent discloses “photosensitive recording materials” for the production of lithographic printing plates or resist images that include a photosensitive, photopolymerizable recording layer, wherein the recording layer contains a polymeric binder provided by a copolymer soluble or dispersible in aqueous medium and a comonomer (See Abstract of the Hoffman Patent). The comonomer is an anhydride of a polymerizable, ethylenically unsaturated monocarboxylic acid (See Abstract of the Hoffman Patent). The Hoffman Patent discloses that 2,4,5-triarylimidazole dimers are suitable photoinitiators for the photosensitive, photopolymerizable layers (Hoffman Patent, col. 6, lines 9-37).

The Hoffman Patent is completely silent regarding the formation of “fish eyes” in a protecting film. Therefore, every combination of the Taguchi Patent, the Mannion Patent and the Hoffman Patent would still fail to disclose the claimed “fish eye” population “measured under a microscope at a multiplication of 100.” For this reason alone, the rejection of claims 12 and 27 under 35 U.S.C. § 103 over the Taguchi Patent in view of the Mannion Patent, and in further view of the Hoffman Patent is untenable and should be withdrawn.

**ii. No Proper Motivation or Suggestion to Combine**

The Examiner has failed to establish a proper motivation or suggestion, grounded in prior art teachings, to justify the combination of the Taguchi Patent, the Mannion Patent and the Hoffman Patent as required by the Federal Circuit. In re Vaeck, 20 U.S.P.Q.2d 1438, 1442 (Fed. Cir. 1991). In particular, the Taguchi Patent relates to a photopolymerizable element. The Mannion Patent is non-analogous art, as discussed above, and relates to a polyolefin composition containing sorbitol and/or xylitol acetal clarifying agent to improve transparency

of injected molded resin articles. The Hoffman Patent relates to photosensitive recording materials, and has nothing to do with photopolymerizable elements or injected molded resin articles. Furthermore, there is simply nothing about the Hoffman Patent that pertains to the prevention of air voids and fish eyes and protecting films.

For all of the above reasons, the Examiner has failed to establish a motivation or suggestion to justify the combination of the disclosure of the Hoffman Patent with the disclosures of the Taguchi Patent and the Mannion Patent. Consequently, the Examiner has failed to establish a prima facie case of obviousness against claims 12 and 27 of the above-captioned application.

**C. Claims 42 and 43**

The arguments in support of independent claims 42 and 43, respectively, incorporate the arguments in support of patentability of claims 1 and 19, as if they were restated here. Specifically, the combination of the Taguchi Patent, the Mannion Patent and the Takahashi Patent does not reasonably disclose the claimed population of “fish eyes” that is “measured under a microscope at a multiplication of 100” and, additionally, a “photosensitive resin composition” comprising (i) “a binder polymer formed by copolymerizing acrylic acid or methacrylic acid and alkyl esters thereof as constituent monomers,” (ii) “a monomer having at least one polymerizable ethylenically unsaturated group in the molecule thereof, wherein the monomer is bisphenol A polyoxyalkylene diacrylate, or contains bisphenol A polyoxyalkylene dimethacrylate as a component,” and (iii) “a photopolymerization initiator” as recited in claims 42 and 43. As admitted by the Examiner, the Taguchi Patent fails to disclose, or even suggest, “the monomer is bisphenol A polyoxyalkylene diacrylate, or contains bisphenol A polyoxyalkylene dimethacrylate as a component,” as recited in claims

42 and 43 (Office Action, dated March 13, 2006, at 6, lines 8-11; and Office Action dated March 24, 2004, at 4, line 13, to at 5, line 5).

**i. The Takahashi Patent**

The Takahashi Patent discloses “photosensitive resin composition for producing a relief printing plate,” wherein the photosensitive resin composition includes (a) a polymer selected from the group consisting of a prepolymer, a binder polymer and a mixture thereof, (b) an ethylenically unsaturated monomer, (c) a specific hindered amine and (d) a photopolymerization initiator (See Abstract of Takahashi Patent). The Takahashi Patent discloses that the ethylenically unsaturated monomer may be ethoxylated bisphenol A diacrylate (Takahashi Patent, col. 33, lines 56-67).

The Takahashi Patent is completely silent regarding the formation of “fish eyes” in a protecting film. Therefore, every combination of the Taguchi Patent, the Mannion Patent and the Takahashi Patent would still fail to disclose the claimed “fish eye” population “measured under a microscope at a multiplication of 100.” For this reason alone, the rejection of claims 42 and 43 under 35 U.S.C. § 103 over the Taguchi Patent in view of the Mannion Patent, and in further view of the Takahashi Patent is untenable and should be withdrawn.

**ii. No Proper Motivation or Suggestion to Combine**

The Examiner has failed to establish a proper motivation or suggestion, grounded in prior art teachings, to justify the combination of the Taguchi Patent, the Mannion Patent and the Takahashi Patent as required by the Federal Circuit. In re Vaeck, 20 U.S.P.Q.2d 1438, 1442 (Fed. Cir. 1991). In particular, the Taguchi Patent relates to a photopolymerizable element. The Mannion Patent is non-analogous art, as discussed above, and relates to a

polyolefin composition containing sorbitol and/or xylitol acetal clarifying agent to improve transparency of injected molded resin articles. The Takahashi Patent relates to photosensitive resin composition for producing a relief printing plate, and has nothing to do with photopolymerizable elements or injected molded resin articles. Furthermore, there is simply nothing about the Takahashi Patent that pertains to the prevention of air voids and fish eyes and protecting films.

For all of the above reasons, the Examiner has failed to establish a motivation or suggestion to justify the combination of the disclosure of the Takahashi Patent with the disclosure of the Taguchi Patent and the Mannion Patent. Consequently, the Examiner has failed to establish a prima facie case of obviousness against claims 42 and 43 of the above-captioned application.

#### D. Claims 44-46

The arguments in support of independent claims 44 to 46, respectively, incorporates the arguments in support of patentability of claims 1, 19 and 36. Specifically, the combination of the Taguchi Patent and the Mannion Patent does not reasonably disclose the claimed population of “fish eyes” that is “measured under a microscope at a multiplication of 100” and, additionally, that “the protecting film...is made of resin filtered after thermal melting” as recited in independent claims 44 to 46. As admitted by the Examiner, the Taguchi Patent and the Mannion Patent fail to disclose, or even suggest, “the protecting film...is made of resin filtered after thermal melting” as recited in claims 44-46 (Office Action, dated March 13, 2006, at 5, lines 14-16).

The Examiner contends that the limitation “the protecting film...is made of resin filtered after thermal melting,” as recited in independent claims 44 to 46, is a product by process limitation that is met simply by any layer made of resin (Office Action, dated March 13, 2006, at 5, lines 14-16). Applicants disagree for the following reasons.

A product-by-process limitation that, when read in context, describes the product more by its structure than by the process used to obtain it is best characterized as a pure product limitation and merits full consideration when patentability is determined. Hanzi v. International Trade Commission, 44 U.S.P.Q.2d 1358, 1363 (Fed. Cir. 1997). In this case, the limitation wherein “the protecting film...is made of resin filtered after thermal melting,” as recited in independent claims 44 to 46, if a product-by-process limitation, describes the product by its structure more than by the process used to obtain this structure and should be fully considered in the patentability determination. Because the Examiner has misconstrued “resin filtered after thermal melting” to include any resin, whether filtered or not, the Examiner’s rejection under Section 103 is facially flawed and must be withdrawn.

The limitation “resin filtered after thermal melting” is described at 13, line 18, to at 14, line 16, of Applicants’ specification, and a person of ordinary skill in the art would immediately recognize, after reading Applicants’ specification, that “resin filtered after thermal melting” is resin that has undergone thermal melting and subsequently been filtered to remove the unmelted raw material and thermally deteriorated regions. In other words, the limitation “resin filtered after thermal melting” describes a smooth resin composition that has had chunks of unmelted raw material and chunks of thermally deteriorated material removed by a filter. Therefore, “resin filtered after thermal melting” squarely describes the resin in terms of its structure (i.e., a resin relatively free of unmelted raw material and thermally degraded regions) and should be given full consideration when patentability of the claims is

determined. Because the phrase “resin filtered after thermal melting” describes resin that is relatively free of unmelted material and thermally degraded regions, the Examiner’s contention that “the layer simply has to be made of resin” is in error which renders the Section 103 rejection untenable.

For all of the above reasons, the Examiner has failed to establish a prima facie case of obviousness against independent claims 44 to 46 because, as admitted by the Examiner, neither the Taguchi Patent nor the Mannion Patent disclose, or suggest, “resin filtered after thermal melting” and because this claimed limitation narrowly defines resin that is relatively free of unmelted material and thermally degraded regions. The limitation “resin filtered after thermal melting” cannot be construed so broadly that it means “the layer simply has to be made of resin” as the Examiner has done. Furthermore, neither the Hoffman Patent nor the Takahashi Patent disclose, or suggest, a “resin filtered after thermal melting.”

**2. The Indicia of Non-Obviousness Presented in this Case is Sufficient to Overcome Any Prima Facie Case of Obviousness Under 35 U.S.C. § 103, Even if One Had Been Properly Established (Which It Has Not).**

A patentability analysis under 35 U.S.C. § 103 requires (a) determining the scope and content of the prior art, (b) ascertaining the differences between the prior art and the claimed subject matter, (c) resolving the level of ordinary skill in the pertinent art, and (d) considering secondary considerations that may serve as indicia of nonobviousness or obviousness. Graham v. John Deere Co. of Kansas City, 148 U.S.P.Q. 459, 467 (1966). In the present case, even if the Examiner had established a prima facie case of obviousness (which she has not), the evidence of superior and unexpected results provided in Applicants’ specification is indicia of nonobviousness sufficient to overcome such a prima facie case.

As shown in Table 2 at 19 of Applicants' specification as originally filed, the present invention is directed to using a number of different protecting films (see Table 2) that provide remarkably flawless photosensitive films (i.e., air voids of only 0-5 per m<sup>2</sup>). In particular, when a photosensitive film, in accordance with independent claims 1, 19, 36, 38 and 42-46 of the present invention is made utilizing a protecting film such as employed in Example 2 (i.e., having zero fish eyes), is compared to a photosensitive film made using a different protecting film such as employed in Comparative Example 2 (i.e., having about 1,200 fish eyes per m<sup>2</sup>), the result is that the photosensitive film of Comparative Example 2 has about 1,000 air voids per m<sup>2</sup>, whereas all of the Examples 1-3 made in accordance with the present have about 0-5 air voids per m<sup>2</sup>! (Applicants' specification, at 19, Table 2).

These results plainly demonstrate substantially superior and unexpected results. See In re Soni, 34 U.S.P.Q.2d 1684, 1688 (Fed. Cir. 1995) ("when an applicant demonstrates substantially improved results,...and states that the results were *unexpected*, this should suffice to establish unexpected results *in the absence of* evidence to the contrary."). While generally the claimed invention must be compared to the closest prior art, In re Johnson, 223 U.S.P.Q. 1260, 1264 (Fed. Cir. 1984), Applicants may compare the claimed invention to subject matter closer to the invention than the closest prior art. Ex parte Humber, 217 U.S.P.Q. 265, 266 (Bd. Pat. App. & Inter. 1981).

In this case, Examples 1 and 2 of the Taguchi Patent, col. 16, line 30, to col. 17, line 60, represent the closest prior art. However, the comparison shown in Table 2 of the present application compares subject matter that is closer to the presently claimed invention than the subject matter taught by the Taguchi Patent. As described by Applicants' specification, the Examples 1-3 and Comparative Example 2 were prepared using the same methods and materials for making the photosensitive resin composition-containing resin layer and used the

same supporting film (i.e., polyethylene terephthalate film)(Applicants' specification, at 15, line 20, to 18, line 14). On the other hand, the photosensitive resin composition-containing resin layer taught in Examples 1 and 2 of the Taguchi Patent contains different components (See Taguchi Patent, col. 16, lines 30-43, and col. 17, lines 20-25), and employs a different supporting film (See Taguchi Patent, col. 16, lines 46-50; and col. 17, lines 25-32) than used to make Examples 1-3 and Comparative Example 2.

Therefore, the presently claimed invention, as recited by claims 1-10, 12-19, 21-25, 27-38 and 42-46, has been compared to subject matter (i.e., Comparative Example 2 of Table 2 of the original disclosure) that is closer to the invention than the subject matter of the closest prior art (i.e., Examples 1 and 2 of the Taguchi Patent). In view of these facts, Applicants have provided ample comparative evidence of substantially superior and unexpected results sufficient to overcome any prima facie showing of obviousness (although no prima facie case of obviousness has been established by the Examiner) against claims 1-10, 12-19, 21-25, 27-38 and 42-46 that employs the Taguchi Patent in combination with one or more of the Mannion Patent, the Hoffman Patent and the Takahashi Patent.

Applicants previously asserted the same evidence of non-obviousness in Amendment (I), filed December 27, 2005, at 26, line 10, to at 28, line 9; however, the Examiner was silent regarding Applicants' evidence of non-obviousness in the Final Office Action of March 13, 2006.

### Conclusion

Applicants have shown that the rejection of independent claims 1, 19, 36, 38, 42, 43, 44, 45 and 45, under 35 U.S.C. § 103, is untenable and should be withdrawn because neither the Taguchi Patent, the Mannion Patent, the Hoffman Patent nor the Takahashi Patent disclose, or suggest, either alone or in combination, multiple features of the claimed invention. First, the combination of the Taguchi Patent and the Mannion Patent does not disclose, or even suggest, a “protecting film...wherein...the number of fish eyes having a diameter of at least 80  $\mu\text{m}$ ...does not exceed 5 fish eyes/ $\text{m}^2$  when measured under a microscope at a multiplication of 100” as recited in independent claims 1, 36, 38, 42 and 44-46 and “a protecting film...wherein the protecting film has fish eyes of a diameter of at least 80  $\mu\text{m}$  in a number not exceeding 5 per square meter when measured under a microscope at a multiplication of 100” as recited by independent claims 19 and 43. The subject matter disclosed by the Hoffman Patent and the Takahashi Patent is insufficient to make up for this deficiency in the disclosures of the Taguchi Patent and the Mannion Patent.

Second, neither the Taguchi Patent, the Mannion Patent, the Hoffman Patent and the Takahashi Patent, disclose or suggest, either alone or in combination, that “the protecting film...is made of resin filtered after thermal melting,” as recited in independent claims 44 to 46.

Third, the rejection of independent claims 1, 19, 36, 38 and 42-46 under 35 U.S.C. § 103, based on the combination of the Taguchi Patent and the Mannion Patent, and possibly one or more of the Hoffman Patent and the Takahashi Patent, is untenable and should be withdrawn because the rejection relies on impermissible hindsight and is not grounded on a suggestion to combine found in prior art. On the contrary, the proposed combination of patents facially fails to provide a motivation or suggestion to justify the combination because

the Mannion Patent is non-analogous art and does not address the same problem as is solved by Applicants' invention, namely, reducing the number of fish eyes in a protecting film of a photosensitive film.

Lastly, assuming, *arguendo*, the Examiner had established a prima facie case of obviousness (which the Examiner has not done), the evidence of substantially superior and unexpected results presented in Applicants' specification, as originally filed, is sufficient indicia of non-obviousness to overcome such an alleged prima facie case.

For all of the above reasons, the Examiner has not established a prima facie case of obviousness against claims 1-10, 12-19, 21-25, 27-38 and 42-46 of the above-captioned application.

Respectfully submitted,

GRIFFIN & SZIPL, P.C.



---

Joerg-Uwe Szipl  
Registration No. 31,799

GRIFFIN & SZIPL, PC  
Suite PH-1  
2300 Ninth Street, South  
Arlington, VA 22204

Telephone: (703) 979-5700  
Facsimile: (703) 979-7429  
E-mail: [GandS@szipl.com](mailto:GandS@szipl.com)  
Customer No.: 24203

**CLAIMS APPENDIX (A)**

1. A photosensitive film which comprises a support film (A), a photosensitive resin composition-containing photosensitive resin layer (B) formed on said support film (A), and a protecting film (C) stuck onto said photosensitive resin layer (B), wherein:

the number of fish eyes having a diameter of at least 80  $\mu\text{m}$  included in said protecting film (C) does not exceed 5 fish eyes/ $\text{m}^2$  when measured under a microscope at a multiplication of 100; and

said photosensitive resin composition-containing photosensitive resin layer (B) has a film thickness of 5 to 30  $\mu\text{m}$ , and whereby

generation of air voids between the photosensitive layer (B) and a substrate after lamination of the photosensitive film on the substrate while removing the protecting film (C) from the photosensitive film is reduced.

2. A photosensitive film according to Claim 1, wherein the photosensitive resin composition in said photosensitive resin layer (B) comprises:

(a) a binder polymer formed by copolymerizing acrylic acid or methacrylic acid and alkyl esters thereof as constituent monomers;

(b) a monomer having at least one polymerizable ethylenically unsaturated group in the molecule thereof; and

(c) a photopolymerization initiator.

3. A photosensitive film according to Claim 1, wherein the adhesive strength between the photosensitive resin composition-containing photosensitive resin layer (B) and the support film (A) is greater than adhesive strength between the photosensitive resin composition-containing photosensitive resin layer (B) and the protecting film (C).

4. A photosensitive film according to claim 3, wherein said protecting film is a polypropylene film.

5. A photosensitive film according to claim 1, wherein said photosensitive film is for use in metal etching process.

6. A photosensitive film according to claim 1, wherein said photosensitive resin layer has a viscosity of 15 to 50 Mpa·s at 30°C.

7. A photosensitive film according to claim 1, wherein said protecting film has a thickness of 5 to 50 $\mu$ m.

8. A photosensitive film according to Claim 2, wherein said binder polymer (a) contains a carboxyl group-containing monomer in an amount of 12 to 40% by weight based on the total amount of the monomers, has a weight-average molecular weight of 20,000 to 300,000, and is used in an amount of 40 to 80 parts by weight; wherein said monomer (b) is used in an amount of 20 to 60 parts by weight; and wherein said photopolymerization initiator (c) is used in an amount of 0.1 to 20 parts by weight, based on 100 parts by weight of the total amounts of (a) and (b).

9. A photosensitive film according to Claim 1, wherein the support film (A) has a film thickness of 12 to 25 $\mu$ m.

10. A photosensitive film according to Claim 2, wherein the binder polymer (a) contains methacrylic acid as a constituting monomer.

11. (Canceled)

12. A photosensitive film according to Claim 2, wherein the photopolymerization initiator (c) contains 2,4,5-triarylimidazole dimer.

13. A photosensitive film according to Claim 1, wherein said photosensitive resin layer (b) has a film thickness in a range of 10-25 $\mu$ m.

14. A photosensitive film according to Claim 1, wherein the height of each fish eye, protruding from a surface of the protecting film, is in a range of 1-50 $\mu$ m.

15. A process for laminating a photosensitive film on a substrate having a metallic surface, which comprises laminating a photosensitive film of Claim 1 on a substrate, while removing the protective film (C) so as to make the photosensitive resin layer (B) adhere to the substrate, wherein generation of air voids between the photosensitive resin later (B) and the substrate is reduced.

16. A photosensitive resin layer laminated substrate obtained by the process of Claim 15.

17. A process for curing a photosensitive resin layer, which comprises exposing the photosensitive resin layer laminated substrate of Claim 16 to light.

18. A photosensitive film according to Claim 1, wherein the protecting film (C) is a film that can be removed at a time of lamination of the photosensitive film on a substrate.

19. A photosensitive film comprising a support film, a photosensitive resin layer on said support film, and a protecting film stuck onto said photosensitive resin layer, wherein the protecting film has fish eyes of a diameter of at least 80 $\mu\text{m}$  in a number not exceeding 5 per square meter when measured under a microscope at a multiplication of 100, and whereby generation of air voids between the photosensitive resin layer and a substrate after lamination of the photosensitive film on the substrate while removing the protecting film from the photosensitive film is reduced.

20. (Canceled)

21. A photosensitive film according to Claim 19, wherein adhesive strength between the photosensitive resin layer and the support film is greater than adhesive strength between the photosensitive resin layer and the protecting film.

22. A photosensitive film according to Claim 19, wherein the support film has a film thickness of 12 to 25 $\mu$ m.

23. A photosensitive film according to Claim 19, wherein the photosensitive resin layer is made from a resin composition comprising:

- (a) a binder polymer formed by copolymerizing acrylic acid or methacrylic acid and alkyl esters thereof as constituent monomers;
- (b) a monomer having at least one polymerizable ethylenically unsaturated group in the molecule thereof; and
- (c) a photopolymerization initiator.

24. A photosensitive film according to Claim 23, wherein the binder polymer (a) contains a carboxyl group-containing monomer in an amount of 12 to 40% by weight based on the total amount of the monomers, has a weight-average molecular weight of 20,000 to 300,000, and is used in an amount of 40 to 80 parts by weight; wherein the monomer (b) is used in an amount of 20 to 60 parts by weight; and wherein the photopolymerization initiator (c) is used in an amount of 0.1 to 20 parts by weight, based on 100 parts by weight of the total amounts of (a) and (b).

25. A photosensitive film according to Claim 23, wherein the binder polymer (a) contains methacrylic acid as a constituent monomer.

26. (Canceled)

27. A photosensitive film according to Claim 23, wherein the photopolymerization initiator (c) contains 2,4,5-triarylimidazole dimer.
28. A photosensitive film according to Claim 19, wherein the protecting film is a polypropylene film.
29. A photosensitive film according to Claim 19, wherein the photosensitive film is a film for use in a metal etching process.
30. A photosensitive film according to Claim 19, wherein the photosensitive resin layer has a viscosity of 15 to 50 Mpa·s at 30°C.
31. A photosensitive film according to Claim 19, wherein the protecting film has a thickness of 5 to 50μm.
32. A photosensitive film according to Claim 19, wherein the protecting film is a film removed at a time of lamination of the photosensitive film on a substrate.
33. A process for laminating a photosensitive film on a substrate, which comprises laminating the photosensitive film of Claim 19 on a substrate, while removing the protecting film so as to make the photosensitive resin layer adhere to the substrate having a metallic surface.

34. A photosensitive resin layer laminated substrate obtained by the process of Claim 33.

35. A process for curing a photosensitive layer, which comprises exposing the photosensitive resin layer laminated substrate of Claim 34 to light.

36. A photosensitive film which comprises a support film (A), a photosensitive resin composition-containing photosensitive resin layer (B) formed on said support film (A), and a protecting film (C) stuck onto said photosensitive resin layer (B), wherein the number of fish eyes having a diameter of at least 80  $\mu\text{m}$  included in said protecting film (C) does not exceed 5 fish eyes/ $\text{m}^2$  when measured under a microscope at a multiplication of 100; and said photosensitive resin composition-containing photosensitive resin layer (B) has a film thickness of 5 to 30  $\mu\text{m}$ , wherein generation of air voids after laminating the photosensitive film on a substrate while removing the protecting film (C) from the photosensitive film at the time of lamination is reduced.

37. A photosensitive film according to claim 1, wherein substantially no fish eyes are disposed in the protective film.

38. A photosensitive film comprising:

(a) a support film;

(b) a photosensitive resin composition-containing photosensitive resin layer formed on the support film; and

(c) a protecting film stuck onto the photosensitive resin layer, wherein:

the support film is selected from the group consisting of polyester films and polyethylene terephthalate films,

the number of fish eyes having a diameter of at least 80  $\mu\text{m}$  included in the protecting film does not exceed 5 fish eyes/ $\text{m}^2$  when measured under a microscope at a multiplication of 100; and

the photosensitive resin composition-containing photosensitive resin layer has a film thickness of 5 to 30  $\mu\text{m}$ , whereby

generation of air voids is reduced between the photosensitive resin layer and a substrate after the photosensitive resin layer is laminated on the substrate after removal of the protecting film from the photosensitive resin layer.

39. (Canceled)

40. (Canceled)

41. (Canceled)

42. A photosensitive film comprising:

(a) a support film;

(b) a photosensitive resin composition-containing photosensitive resin layer formed on the support film, wherein the photosensitive resin composition in the photosensitive resin layer comprises:

i. a binder polymer formed by copolymerizing acrylic acid or methacrylic acid and alkyl esters thereof as constituent monomers;

ii. a monomer having at least one polymerizable ethylenically unsaturated group in the molecule thereof, wherein the monomer is bisphenol A polyoxyalkylene diacrylate, or contains bisphenol A polyoxyalkylene dimethacrylate as a component; and

iii. a photopolymerization initiator; and

(c) a protecting film stuck onto the photosensitive resin layer, wherein:

the number of fish eyes having a diameter of at least 80  $\mu\text{m}$  included in the protecting film does not exceed 5 fish eyes/ $\text{m}^2$  when measured under a microscope at a multiplication of 100; and

the photosensitive resin composition-containing photosensitive resin layer has a film thickness of 5 to 30  $\mu\text{m}$ , whereby generation of air voids between the photosensitive layer and a substrate after lamination of the photosensitive film on the substrate while removing the protecting film from the photosensitive film is reduced.

43. A photosensitive film comprising:

(a) a support film;

(b) a photosensitive resin layer on the support film, wherein the photosensitive resin layer is made from a resin composition comprising:

i. a binder polymer formed by copolymerizing acrylic acid or methacrylic acid and alkyl esters thereof as constituent monomers;

ii. a monomer having at least one polymerizable ethylenically unsaturated group in the molecule thereof, wherein the monomer is bisphenol A polyoxyalkylene diacrylate or contains bisphenol A polyoxyalkylene dimethacrylate as a component; and

iii. a photopolymerization initiator; and

(c) a protecting film stuck onto the photosensitive resin layer, wherein the protecting film has fish eyes of a diameter of at least 80 $\mu\text{m}$  in a number not exceeding 5 per square meter when measured under a microscope at a multiplication of 100, and whereby generation of air voids between the photosensitive resin layer and a substrate after lamination of the photosensitive film on the substrate while removing the protecting film from the photosensitive film is reduced.

44. A photosensitive film which comprises a support film (A), a photosensitive resin composition-containing photosensitive resin layer (B) formed on said support film (A), and a protecting film (C) stuck onto said photosensitive resin layer (B) wherein the protecting film (C) is made of resin filtered after thermal melting, wherein:

the number of fish eyes having a diameter of at least 80  $\mu\text{m}$  included in said protecting film (C) does not exceed 5 fish eyes/ $\text{m}^2$  when measured under a microscope at a multiplication of 100; and

said photosensitive resin composition-containing photosensitive resin layer (B) has a film thickness of 5 to 30  $\mu\text{m}$ , and whereby

generation of air voids between the photosensitive layer (B) and a substrate after lamination of the photosensitive film on the substrate while removing the protecting film (C) from the photosensitive film is reduced.

45. A photosensitive film comprising:

- a support film;
- a photosensitive resin layer on said support film; and

a protecting film stuck onto said photosensitive resin layer wherein the protecting film is made of resin filtered after thermal melting and has fish eyes of a diameter of at least 80 $\mu\text{m}$  in a number not exceeding 5 per square meter when measured under a microscope at a multiplication of 100, and whereby generation of air voids between the photosensitive resin layer and a substrate after lamination of the photosensitive film on the substrate while removing the protecting film from the photosensitive film is reduced.

46. A photosensitive film which comprises a support film (A), a photosensitive resin composition-containing photosensitive resin layer (B) formed on said support film (A), and a protecting film (C) stuck onto said photosensitive resin layer (B) wherein the protecting film (C) is made of resin filtered after thermal melting, wherein:

- the number of fish eyes having a diameter of at least 80  $\mu\text{m}$  included in said protecting film (C) does not exceed 5 fish eyes/ $\text{m}^2$  when measured under a microscope at a multiplication of 100; and

said photosensitive resin composition-containing photosensitive resin layer (B) has a film thickness of 5 to 30  $\mu\text{m}$ , wherein generation of air voids after laminating the photosensitive film on a substrate while removing the protecting film (C) from the photosensitive film at the time of lamination is reduced.

**EVIDENCE APPENDIX (B)**

1. Declaration under 37 C.F.R. § 1.132 of Chikara ISHIKAWA dated November 19, 2002 and entered by the Examiner as set forth by the Office Action, dated August 25, 2006 page 6 at 5, lines 3-5.
2. Second Declaration under 37 C.F.R. § 1.132 of Chikara ISHIKAWA dated June 1, 2005 and entered by the Examiner as set forth by the Office Action, dated August 25, 2005, at 6, lines 17-19.

**RELATED PROCEEDINGS APPENDIX (C)**

None.

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

In re application of )  
Jinko KIMURA et al. ) Atty. Docket No.: ASAMU0005  
Serial No. 09/508,771 )  
Filed: March 16, 2000 ) Group Art Unit: 1752  
For: PHOTOSENSITIVE FILM ) Examiner: C. Hamilton  
 )  
 )

**DECLARATION UNDER 37 C.F.R. § 1.132**

Assistant Commissioner for Patents  
Washington, D. C. 20231

1. I, Chikara ISHIKAWA, state that I am an over 21 years old and competent to make this declaration. A copy of my curriculum vitae is attached hereto.
  
2. I am familiar with the above-captioned patent application, the invention claimed therein, and the prior art references cited against the claims of the application in the office action dated April 16, 2002. Specifically, I am familiar with the Fifield et al. reference (German Document DE 3825782 A1).
  
3. The foregoing experimental results were collected by me, or by others under my direct supervision, and the experiments contained herein were performed under my direction or with my understanding and knowledge.

4. Experimental Conditions

- a. The purpose of the first experiment is to establish the relation between film thickness of the photosensitive resin layer and the generation rate of air voids. The first experiment corresponds to the "Test Report" previously filed relating to the above-captioned application on June 20, 2001.
- b. The purpose of the second experiment is to compare the size and number of fish eyes present in the protecting film of a comparative example closest to the protecting film disclosed by the Fifield et al. reference ("prior art protecting film") and a protecting film usable in the present invention ("present protecting film").

5. First Experiment ("Test Report")

A resolution for forming a photosensitive resin layer was prepared by using Formulation 1 disclosed in Table 1 on page 16 of the specification of the above-identified application.

The solution thus obtained was uniformly coated on a polyethylene terephthalate film having a thickness of 16  $\mu\text{m}$  and dried for 5 minutes in a hot air circulation type oven kept at 100° C. The thickness of the photosensitive resin layer was varied in 5  $\mu\text{m}$ , 10  $\mu\text{m}$ , 20  $\mu\text{m}$ , 30  $\mu\text{m}$  and 40  $\mu\text{m}$ . Then, the following protecting film was laminated thereon to obtain photosensitive films:

NF-13 (polyethylene film mfd. by Tamapoly Co.)  
film thickness: 25  $\mu\text{m}$   
number of fish eyes having a diameter of 80  $\mu\text{m}$  or more per  $\text{m}^2$ : ca. 1,000

Each photosensitive film was laminated on a substrate while removing the protecting film at a roll temperature of 110° C, under a pressure of 4 kg·f/cm<sup>2</sup>, at a speed of 2 m/min. The

laminated substrate thus obtained was exposed to light by means of a 3 kW Super-High Pressure Mercury Lamp (HMW-201GX, mfd. by ORC Seisakusho, Ltd.) at 50 mJ/cm<sup>2</sup>.

After the exposure, the number of air voids generated on the substrate in the portions of 10 fish eyes having a diameter of 100 μm and the height from the film surface of 6 μm was measured using a microscope with a multiplication of 100.

The relation between the film thickness of the photosensitive resin layer and the generation rate of air voids is shown in the following Table 1:

TABLE I

Thickness of photo-sensitive resin layer	5 μm	10 μm	20 μm	30 μm	40 μm
Generation rate of air voids (%)	100	100	80	20	0

As shown in the above Table 1, when the film thickness of the photosensitive resin layer is 5 to 30 μm, air voids are generated. Particularly, when the film thickness of the photosensitive resin layer is 5 to 20 μm, the generation rate of air voids is as large as 80 to 100%. On the other hand, when the film thickness of the photosensitive resin layer is as thick as 40 μm, no air void was generated, even if the protecting film has fish eyes of about 1000 per m<sup>2</sup>.

The clear conclusion is that the generation of air voids is dependent upon the thickness of the photosensitive resin layer. This dependence on the thickness of the photosensitive layer is non-linear. As shown by the data, there is no dependence upon the thickness of the photosensitive layer until a critical minimum thickness of 40 μm is reached, then the generation of air voids rapidly increases as the thickness decreases until there is 100% air void generation rate at a thickness of 10 μm. The problem solved by the present invention is precisely this appearance of fish eyes as voids when the photosensitive film thickness is below the critical

range of 30  $\mu\text{m}$ . This problem was not recognized by the prior art, including the Fifield reference.

Thus, it is totally unexpected that one could achieve the extremely low number of "5 fish eyes/ $\text{m}^2$ " when measured under a microscope at a multiplication of 100" when the photosensitivity layer (B) has a thickness of 5 to 30  $\mu\text{m}$  as claimed.

## 6. Second Experiment

A resolution for forming a photosensitive resin layer was prepared by using Formulation I disclosed in Table 1 on page 16 of the specification of the above-identified application.

The solution thus obtained was uniformly coated on a polyethylene terephthalate film having a thickness of 16  $\mu\text{m}$  and dried for 5 minutes in a hot air circulation type oven kept at 100° C. Then, either the protecting film NF-13 (prior art protecting film) of comparative Example 1 or the protecting film E-200C (present protecting film) of Example 1 was laminated thereon to obtain photosensitive films respectively. Protecting film NF-13 corresponds to the prior art protecting film disclosed by the Fifield et al. reference because both films are low-density polyethylene films. After dryness, thickness of the photosensitive resin layer was 15  $\mu\text{m}$ . The size and number of fish eyes on each protecting film of the prior art and of the present invention were measured under a microscope at a multiplication of 100.

The size (practical diameters) and number of fish eyes in the prior art protecting film and in the present protecting film are shown in the following Table 2:

TABLE 2

Example No.	Protecting Film	Diameter of fish eye	
		100 $\pm$ 10 $\mu\text{m}$	200 $\pm$ 10 $\mu\text{m}$
Comparative Example 1	NF-13	Ca. 900/ $\text{m}^2$	Ca. 100/ $\text{m}^2$
Example 4	E-200C	0/ $\text{m}^2$	0/ $\text{m}^2$

It is noted that Table 2 above compares to Table 2 on page 19 of the present specification wherein the number of fish eyes for NF-13 of Comparative Example 1 is ca. 1000/ $\text{m}^2$  when the diameter is  $\geq 80 \mu\text{m}$ .

The data clearly shows that a low-density polyethylene protecting film such as NF-13, which corresponds to the protecting film disclosed by the Fifield et al. reference, would have fish eyes of a larger diameter and in greater quantities than protecting films used in accordance with the present invention.

The clear conclusion is that the generation of air voids is also dependent upon selecting a protecting layer with suitable properties. While a low-density polyethylene protecting film, such as NF-13, is not suitable for use in accordance with the present invention, a polypropylene protecting film such as E-200C is suitable.

## 7. Discussion of the Results

Independent claims 1, 19 and 36 in accordance with the present invention recite that the protecting film has fish eyes of a diameter of at least 80  $\mu\text{m}$  in a number not exceeding 5 per square meter when measured under a microscope at a multiplication of 100. The results of the

Second Experiment show that a polyethylene film, such as taught by the Fifield et al. reference, cannot meet this limitation. In addition, claims 11 and 36 recite that the photosensitive resin composition-containing photosensitive resin layer (B) has a film thickness of 5 to 30  $\mu\text{m}$ . The results of the First Experiment show that this range of film thickness would increase the air void generation rate when polyethylene protecting films are used, and that the result according to the present invention of fish eyes "not exceeding 5 fish eyes/ $\text{m}^2$  when measured at a multiplication of 100<sup>n</sup> with a photosensitive film thickness of 5 to 30  $\mu\text{m}$  would be totally unexpected.

8. I declare under penalty of perjury that the foregoing is true and correct, that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements so made are punishable by fine or imprisonment, or both, under 18 U.S.C. § 1001 and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Signed by,

Date: November 19, 2002

Signature: Chikara Ishikawa

Name: Chikara ISHIKAWA

Title: \_\_\_\_\_

**CHIKARA ISHIKAWA**  
1325 Akahama,  
Takahagi-shi, Ibaraki-ken, Japan  
(Japanese Citizen)

March 1993

Graduated from a master course of Faculty of Engineering, Yamagata University

April 1993

Began employment with Hitachi Chemical Company, Ltd. And has been engaged in said company since that time in the study and development of photosensitive films.

Inventor of U.S. Patent Application Serial No. 09/508,771 and is well aware of the prosecution history thereof.

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

In re application of: )  
Jinko KIMURA et al. ) Atty. Docket No.: ASAMU0005  
Serial No. 09/508,771 )  
Filed: March 16, 2000 ) Group Art Unit: 1752  
For: PHOTOSENSITIVE FILM ) Examiner: Amanda C. WALKE  
 )

**ISHIKAWA'S SECOND DECLARATION UNDER 37 C.F.R. § 1.132**

Assistant Commissioner for Patents  
Washington, D. C. 20231

Sir:

1. I, Chikara ISHIKAWA, state that I am an inventor of, and an expert in the field of the presently claimed invention, as supported by my Curriculum Vitae, a copy of which was previously filed on December 11, 2002.
  
2. I am familiar with the above captioned application and claims. In this declaration, I submit my expert opinion regarding the scope of the teachings of U.S. Patent 4,360,582 to Taguchi et al. (hereafter, the Taguchi Patent). Based on my own knowledge and experience, and my review of the contents of the Taguchi Patent, the specification of the above-captioned application, and the teachings on pages 88-91 and 242-243 of the textbook titled "Plastic Films – Processing and Application (2<sup>nd</sup> Ed.)" edited by T. Okiyama (of record, and hereafter referred to as the "Plastic Films textbook"), which are sources of information an expert in my field would reasonably rely upon in rendering an opinion, it is my opinion that the Taguchi Patent does not teach, or suggest, a polypropylene film would inherently possess fish eyes having a

diameter of 80  $\mu\text{m}$  included in the protecting film in numbers that do not exceed 5 fish eyes/ $\text{m}^2$  when measured under a microscope at a multiplication of 100x. Furthermore, based on my own knowledge and experience, it is my expert opinion that the use of a microscope to characterize the fish eye population of a protecting film will produce a different measured result than when the fish eye population is examined using only the naked eye. The basis for my opinion is fully explained below.

**Analysis of the Taguchi Patent**

3. I have thoroughly reviewed the Taguchi Patent. My analysis and interpretation of the teachings of the Taguchi Patent are as follows.
4. The Taguchi Patent teaches a "photopolymerizable element" for producing photoresists used in manufacturing printed circuit boards that includes: (1) a layer of a photopolymerizable composition, (2) a film support laminated to the composition layer and optionally (3) a strippable protective film (see Abstract). The thickness of the composition layer is 0.1 to 1,000  $\mu$  (col. 9, lines 15-19) with the thickness of the film support being 5 to 100  $\mu$  (col. 9, lines 20-22) and the thickness of the protective film being 8 to 80  $\mu$  (col. 10, lines 22-23). Numerous materials are available for making the protective layer, but there is no mention of using low quality LDPE.
5. More specifically, the Taguchi Patent teaches the protective film is provided on one surface of the photopolymerizable layer and the film support is laminated onto the other surface, wherein the protective layer is used for preventing blocking at the winding step and adhesion of dust during handling (col. 3, lines 62-68). The Taguchi Patent teaches that the

film support is a transparent film capable of being dissolved or dispersed in a developer, and that the film support is selected from the group consisting of methyl methacrylate homopolymer and copolymers, vinyl chloride homopolymer and copolymers, polyvinyl alcohol, and mixtures thereof (col. 4, lines 51-62). The Taguchi Patent teaches the use of trimethylolpropane trimethacrylate as a photopolymerizable monomer for making a photopolymerizable layer, but that other materials such as the methyl methacrylate homopolymer and copolymer and a list of other compounds would be used as an organic polymer binder (col. 5, line 27, to col. 6, line 23).

6. The Taguchi Patent teaches that the use of polyethylene terephthalate as the film support has certain disadvantages, such a tendency for the photosensitive layer to be destroyed when stripping the film support when the thickness of the photosensitive layer is reduced (col. 2, line 38, to col. 3, line 8). The Taguchi Patent also teaches the protective film could be selected from a polyethylene terephthalate film, a polypropylene film, a polyethylene film, a cellulose triacetate film, a cellulose diacetate film, a polyamide film, a polytetrafluoroethylene film, a paper, a polyethylene-laminated paper and a polypropylene-laminated paper (col. 10, lines 15-24).

7. I believe it is important that Taguchi teaches the protective film (10), such as shown in Figure 4, is an optional feature of the photopolymerizable element (col. 14, lines 57-60). I also believe it is important that, while Taguchi provides certain examples of a photosensitive element utilizing the optional protective film, these examples focus primarily on the use of a polyethylene film (col. 18, lines 9-52).

8. Furthermore, the Taguchi Patent explains the use of the photopolymerizable element referred to in Figures 1 to 9 (col. 14, line 43, to col. 15, line 35). As shown in Figure 5, the protective film (10), (e.g., a polypropylene film) is peeled off and the surfaces of the photopolymerizable layers (9) and (12) are applied to both surfaces of the copper-clad insulating substrate, whereby at least both openings of each of the through-holes (4), (5) are covered with the photopolymerizable layers (9) and (12), (See Fig. 5 and col. 14, line 59, to col. 15, line 1). The diameter of the through-holes (4) and (5), which have no relation to the fish eyes, are by far larger than the size of fish eyes. In view of these teachings, it is my expert opinion that the Taguchi Patent is not addressing the problem solved by the invention of the above-captioned application.

9. It is my understanding the Examiner contends the Taguchi Patent is silent regarding the subject matter of fish eyes (See Office Action, dated January 11, 2005, at 3, lines 11-13; and Office Action, dated March 24, 2004, at 4, lines 1-3). Based on my analysis of the Taguchi Patent, I agree that this document is completely silent with respect to fish eyes. However, based on my own knowledge and experience, and based on the teachings of the specification of the present application and the teachings of the Plastic Films textbook, in my opinion, a fish eye population having fish eyes of diameter 80  $\mu\text{m}$  included in the protecting film in numbers that do not exceed 5 fish eyes/ $\text{m}^2$ , when measured under a microscope at a multiplication of 100x, is not a feature of the polypropylene protecting film of the Taguchi Patent. This feature would not flow naturally from the teachings of the Taguchi Patent. On the contrary, I conclude it is highly unlikely the polypropylene protecting film taught by the

Taguchi Patent would have the same number of fish eyes as recited in the independent claims 1, 19, 36, 38, 42 and 43. The basis for my conclusion is provided below.

**Analysis of Other Information Sources**

10. First, the specification of the above-captioned application states, in the section labeled "Background Art," it is known to use polyolefin protecting films, such as a polyethylene or polypropylene films, but these films generate high numbers of fish eye defects (See Specification, at 3, lines 2-28). More specifically, such conventional protecting films are produced by thermally melting and kneading a raw material, and then forming the film by extrusion, biaxial orientation or casting (See Specification, at 3, lines 5-10). Fish eyes are formed in the conventional protecting material due to either persistence of unmelted raw material, or formation of thermally deteriorated regions, during the melting of raw material (See Specification, at 3, lines 8-10). Based on my knowledge and experience in the field of producing protecting films for use in making photosensitive films, I agree fish eyes are formed in polyethylene films, and in polypropylene films, which are formed by thermal melting and kneading of a raw material. Fish eyes are due to incomplete melting of raw material, or formation of thermally deteriorated regions in the raw material, both of which occur due to non-uniform heating during the film formation process.

11. The present specification also discloses that protecting films used in the present invention have been specially produced by modifying the conventional manufacturing process, such as by adding an extra filtering step after thermal melting (See Specification at 14, lines 12-16). In accordance with this illustrative manufacturing technique, the protecting film can

be made to have fewer fish eyes by filtering out unmelted particles of raw material. Claims 39, 40 and 41 explicitly recite an embodiment wherein "the protecting film...is made of resin filtered after thermal melting." Additionally, the present specification provides examples of polypropylene films, which have been manufactured to meet the requirements of the present invention, such as Torayfan BO-2400 manufactured by Toray Industries, Inc. and ALPHAN E200 Series manufactured by Oji Paper Co., Ltd. (See Specification at 14, lines 17-22).

12. Based on the disclosure of the above-captioned application, and my own knowledge and experience in the art, I conclude protecting films used in the present invention are not run-of-the-mill protecting films, but are films carefully and deliberately manufactured to have fewer fish eye defects. This result may be achieved through additional processing steps, such as filtering the resin after the raw material has been heated, in order to remove unmelted particles. Furthermore, based on my review of the Taguchi Patent, I conclude there is no teaching, or suggestion, in the Taguchi Patent that would lead a person of ordinary skill in the art to believe the polypropylene films used by Taguchi, and described at col. 16, lines 59-63, and at col. 17, lines 32-36, are anything but conventional polypropylene films, which would have fish eyes far in excess of the "5 fish eyes/m<sup>2</sup>" limit required by the present invention. In particular, I point out there is no teaching in the Taguchi Patent pertaining to, or even suggesting, (a) filtering the resin after thermal melting of the raw material in order to remove unmelted particles, or (b) the use of either a Torayfan BO-2400 polypropylene film or the use of an ALPHAN E200 Series polypropylene film, or (c) the application of any other manufacturing process for preventing the formation of fish eyes in the protective film.

13. Based on this information alone, I believe a person of ordinary skill in the art would recognize that the polypropylene films taught by the Taguchi Patent do not inherently include the characteristic wherein "the number of fish eyes having a diameter of at least 80  $\mu\text{m}$  included in said protecting film...does not exceed 5 fish eyes/ $\text{m}^2$  when measured under a microscope at a multiplication of 100."

14. Second, it is a known fact to those of ordinary skill in the art that not all polypropylene films inherently meet the limitation wherein "the number of fish eyes having a diameter of at least 80  $\mu\text{m}$  included in said protecting film...does not exceed 5 fish eyes/ $\text{m}^2$  when measured under a microscope at a multiplication of 100." This fact is established by my own knowledge and by Comparative Example 2 of Table 2 of the present application, which provides at least one example of a polypropylene protecting film that does not meet this limitation. Specifically, the polypropylene protecting film of Comparative Example 2 is a "PP-Type R" film manufactured by the Shin-Etsu Film Co. This film has about 1,200 fish eyes per  $\text{m}^2$  having a diameter of at least 80  $\mu\text{m}$ . Therefore, based on my own knowledge, and the data regarding the polypropylene film "PP-Type R" manufactured by the Shin-Etsu Film Co., I conclude polypropylene films do not typically have the characteristic wherein the number of fish eyes having a diameter of at least 80  $\mu\text{m}$  included in the protecting film does not exceed 5 fish eyes/ $\text{m}^2$  when measured under a microscope at a multiplication of 100.

15. Thirdly, the Plastic Film textbook teaches, in Table 2.12, that there are multiple different film forming methods for forming a polypropylene film, such as the inflation method,

casting (i.e., the "T-die method"), and stretching (See Plastic Film textbook, at 89). This, of course, is information I believe is generally known by those of ordinary skill in the art. The Plastic Film textbook also teaches, in Table 4.10, that various properties of a polypropylene film are affected by the film forming method employed (See Plastic Film textbook at 243). For example, film properties, such as specific gravity, tensile strength, breaking extension, tear propagation strength, and impact strength, vary significantly depending upon whether the polypropylene film is formed by casting or by biaxial stretching. Therefore, the Plastic Film textbook stands for the proposition that a property of a polypropylene film may vary significantly depending upon the method used to form the film.

16. In the present case, the Taguchi Patent is completely silent with respect to how the polypropylene protecting film is formed. Therefore, for a person of ordinary skill in the art, the Taguchi Patent lacks a disclosure sufficient to show what fish eye population would be the natural result flowing from its teachings. In other words, based on my review of the Taguchi Patent (which provides no description pertaining to how the polypropylene films mentioned therein were made), and based on my knowledge and experience in the art, and based on the Plastic Films textbook (which teaches variability in film properties depends upon how the film is formed), all of which are information sources reasonably relied upon by experts in my field when forming opinions, I conclude it is highly unlikely the polypropylene films mentioned in the Taguchi Patent would have the desired fish eye population wherein the number of fish eyes having a diameter of at least 80  $\mu\text{m}$  included in the protecting film does not exceed 5 fish eyes/ $\text{m}^2$  when measured under a microscope at a multiplication of 100. In particular, in my opinion, a polypropylene film randomly selected would not have the required number

of fish eyes, but would have a significantly greater fish eye population.

### Use of Microscopes

17. Based on my knowledge and experience in the art, the use of a microscope may facilitate the characterization of the fish eye population of a protecting film, such as those protecting films used in the present invention. Many fish eyes larger than 80  $\mu\text{m}$  are visible to the naked eye. However, those fish eyes that are about 80 to 90  $\mu\text{m}$  in diameter are at the limits of human visual acuity, and may be missed without the use of a magnifier. Furthermore, even for those small fish eyes that may be seen with the naked eye, measurement accuracy is improved when a microscope is used. Therefore, based on my knowledge and experience in the field of evaluating fish eye defects in films, how a fish eye population is measured will effect measurement error, which will effect the ability of persons of ordinary skill in the art to compare the quality of different protecting films based on fish eye population. In other words, when characterizing fish eye populations, it matters whether the fish eye population was counted based on what is seen by the naked eye or whether the fish eye population was counted using a microscope or other magnifier.

### Conclusions

18. Based on my knowledge and experience, and my review of (a) the Taguchi Patent, (b) the disclosure of the present application, and (c) the Plastic Films textbook, which are materials an expert in the field would reasonably rely upon in rendering an opinion, I conclude the following:

- (a) the Taguchi Patent is completely silent regarding the number of fish eyes in the

- polypropylene protecting films taught therein;
- (b) the Taguchi Patent lacks a disclosure sufficient to show what fish eye population would be the natural result flowing from its teachings;
- (c) as evident by the polypropylene protecting film "PP-Type R," manufactured by the Shin-Etsu Film Co., not all polypropylene protecting films inherently have the fish eye population wherein the number of fish eyes having a diameter of at least 80  $\mu\text{m}$  does not exceed 5 fish eyes per  $\text{m}^2$ ;
- (d) as described in the specification of the above-captioned application, polypropylene protecting films having the required number of fish eyes are specially prepared using more involved manufacturing methods (i.e., including a resin filtering step to filter unmelted raw material from the resin) than are typically used, or are specifically selected polypropylene films (i.e., Torayfan BO-2400 or ALPHAN E200 Series polypropylene films); and
- (e) that random polypropylene films, either prepared under run-of-the-mill conditions, or selected randomly without regard to the method of film formation, are unlikely to have a fish eye population limited to not exceeding 5 fish eyes per  $\text{m}^2$  for fish eyes of at least 80  $\mu\text{m}$  diameter.

19. Based on these conclusions, which are formed after considering materials used by experts in the field, it is my opinion the Taguchi Patent does not teach, or suggest, a polypropylene film would inherently possess fish eyes having a diameter of 80  $\mu\text{m}$  included in the protecting film in numbers that do not exceed 5 fish eyes/ $\text{m}^2$  when measured under a microscope at a multiplication of 100x.

20. Based on my knowledge and experience, I further conclude the following:
- (f) the fish eye population of a protecting film is characterized based on human observation, therefore, it matters whether the fish eye population was counted based on what is seen by the naked eye or whether the fish eye population was counted using a microscope or other magnifier.
21. Based on this conclusion, it is my opinion that how a fish eye population is measured, whether using the naked eye or a microscope, is a limiting factor when comparing different protecting films.
22. I declare under penalty of perjury that the foregoing is true and correct, that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements so made are punishable by fine or imprisonment, or both, under 18 U.S.C. § 1001 and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Signed by,

Date: June 1, 2005

Chikara Ishikawa  
Chikara ISHIKAWA